A new proximal dorsal approach for DIP arthroplasty

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A New Proximal Dorsal Approach for DIP Arthroplasty

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Abstract: Degenerative changes of the distal interphalangeal (DIP) joints can be painful, disabling, and disfiguring. Swanson spacers can be used for DIP arthroplasty. The standard approach for Swanson spacer implantation at the DIP joint involves transecting the extensor tendon close to its insertion, which necessitates a 6-week period of postoperative immobilization. Another DIP approach involves sparing the extensor tendons, as already published. Both techniques lead to a similar range of motion of the replaced DIP joints. We present a novel approach for DIP joint arthroplasty with division of the extensor tendon in zone 2 with only 2 weeks of postoperative immobilization. Optimizing the motion-preserving operative approaches is of value to our high-demand patients. Postoperative results do not differ from the postoperative range of motion published in the literature for both tendon-sparing and standard approaches. But our approach is technically easy and requires a significantly shorter time of immobilization.

Key Words: DIP arthroplasty, silastic spacer, dorsal approach, immobilization period, rehabilitation

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Degenerative changes at the finger joints can be painful, disabling, and also disfiguring.[1,2] As hand surgeons, we are often faced with these problems. While joint replacement with Swanson spacers is commonly used when treating osteoarthritis of the proximal interphalangeal (PIP) and metacarpophalangeal joints,[3] arthrodesis is often recommended for the osteoarthritic distal interphalangeal (DIP) joint.[4] However, especially high-demand patients including, for example, musicians tend to opt for a solution that preserves mobility within the DIP joint.[5] In the index finger, a mobile DIP is important for pinch, and, in the middle finger, the DIP joint is involved in chuck pinch. The DIP joints of the ring and small fingers are important in span gripping.[1] In effect, several reports on DIP joint replacement have been published.[6] For this surgery, the classic approach for Swanson spacer implantation involves transecting the extensor tendon close to its insertion, a location where it is extremely thin and fragile. Because of this local weakness of the extensor tendon, a 6-week period of postoperative immobilization is required, which like any immobilization period is associated with a loss of joint motion.

An alternative approach involves sparing the extensor tendons while approaching the DIP laterally by sectioning the collateral band on one side.[1] However, this approach is technically more demanding and is associated with a higher risk of misplacement of the implant, as the overall joint exposure will not be as good as with a dorsal approach. Yet, if this approach is correctly performed without damage to the extensor tendon, no postoperative casting period is required.

Taking into consideration the potential downsides to both approaches mentioned, we are presenting a new approach that is, on the one hand, straightforward and easy to do but, at the same time, minimizes the time of postoperative splinting, as it allows for a postoperative immobilization time of only 2 weeks by moving the division of the extensor tendon more proximally.

ANATOMY

The DIP joint anatomy is very similar to that of the PIP joints with smaller joint structures. Dorsally, the extensor tendon passes over the DIP joint. On the radial and ulnar side, collateral and accessory collateral ligaments stabilize the joint. A palmar plate is also present at the DIP joint but does not have any bony attachments proximally. On the palmar side the flexor digitorum profundus tendon inserts just distal to the DIP joint on the base of the distal pahalnx. Arthroplasty at the DIP joint

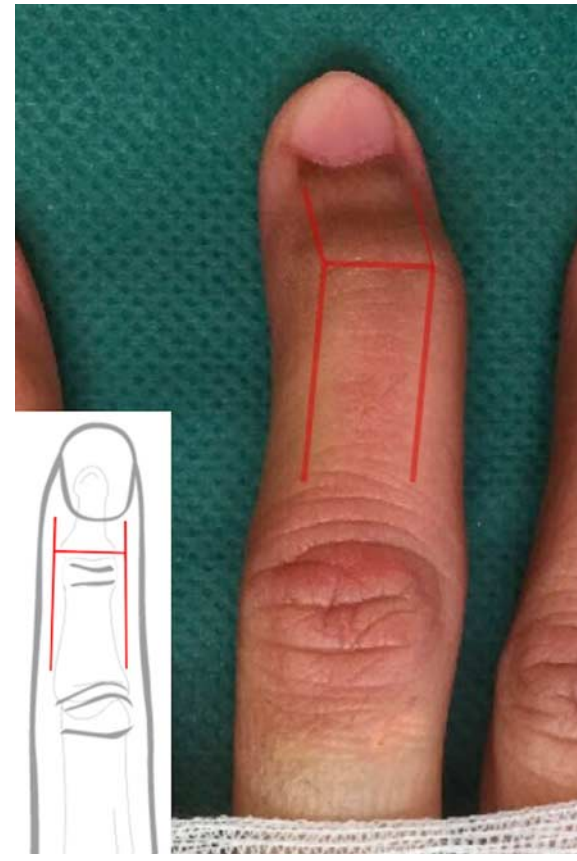

FIGURE 1. Outlines of the dorsal H-shaped approach to the DIP. DIP indicates distal interphalangeal.

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can generally be perceived to be more intricate due to the overall smaller anatomy, with the head of the middle phalanx measuring only an average of 9.6 mm × 5.8 mm.[7]

INDICATIONS/CONTRAINDICATIONS

It is generally accepted that fusion of the distal joint is durable, stable, and highly effective in relieving pain with the obvious disadvantage of eliminating motion at the DIP joint. Patients with severe symptomatic degenerative alterations at the DIP joint who request preservation of motion can potential qualify for silastic spacer implantation, as silicone interpositional arthroplasty of the DIP joint offers the advantage of retaining a limited, yet stable flexion arc of the distal joint.[8]

TECHNIQUE

An H-shaped skin incision is performed over the DIP joint, which is a well-established technique; however, for this approach, the legs of the "H" need to be slightly longer, as the incision needs to be drawn further proximally (Fig. 1).

The skin flaps are then folded back distally and proximally, and the extensor tendon is incised in zone 2 just distal to the central slip insertion. In our opinion, this location is ideal for separation, as we basically have 2 competent tendon strips in this location held together by the triangular ligament (Fig. 2).

The extensor apparatus is then flipped distally, the DIP joint is prepared as desired, and the Swanson spacer is implanted in the standard manner (Fig. 3). After positioning of the prosthesis, the extensor tendon is sutured back with 2 crossed sutures, one per slip, and we use a 4-0 nonresorbable monofilament suture (Fig. 4).

Postoperatively, our patients receive a DIP splint in slight hyperextension for 2 weeks and start mobilizing the joint without protection 2 weeks postoperatively. Patients were encouraged to wear a night time DIP splint for 4 more weeks. We measure the DIP joint range of motion at 2, 6, and 12 weeks postoperatively.

CLINICAL EXPERIENCE

We implanted 8 Silastic Spacers in DIP joints in 4 patients (2 men and 2 women) with the new approach:

We reviewed all our patients with a follow-up of at least 3 months.

All DIP joints we operated on were stable at the 12-week control, and all patients were satisfied with the esthetic result.

At 3 months postoperatively, we measured a mean range of motion at the DIP joint of 40 degrees and a mean extension lag of 10 degrees with a maximum extension lag of 20 degrees. These postoperative functional results are similar to the ones published in the literature.[1]

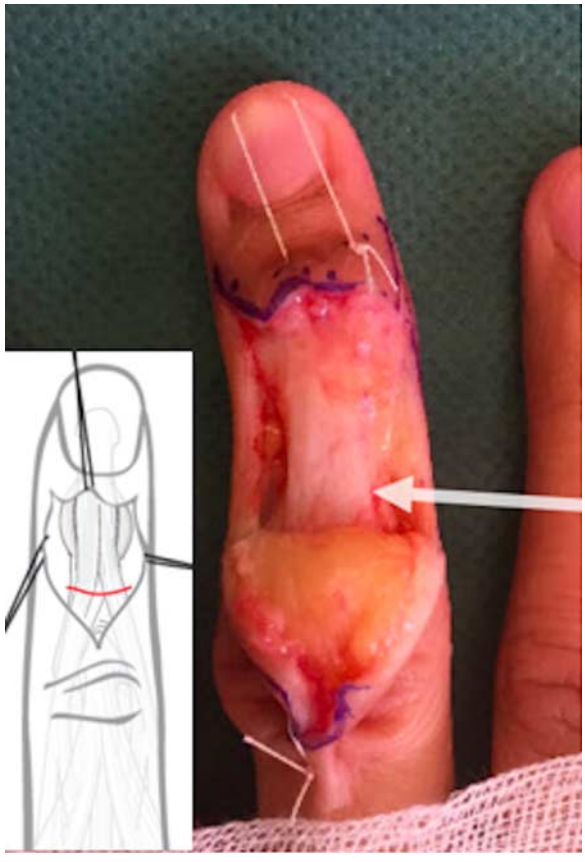

FIGURE 2. Exposure of the extensor tendon by creation of a distal and a proximal based skin flap. The location for division of the extensor tendon in zone 2 just distal to the central slip insertion is marked by the arrow.

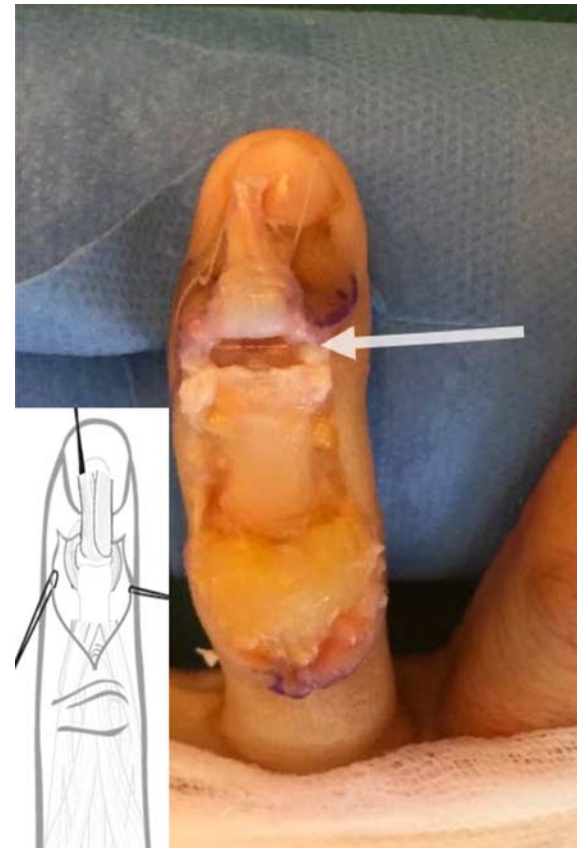

FIGURE 3. The extensor apparatus is then flipped distally, the DIP joint is prepared as desired and the Swanson spacer is implanted in the standard manner. Here you can see it already in place (marked with the arrow). DIP indicates distal interphalangeal.

FIGURE 4. After positioning of the prosthesis, the extensor tendon is sutured back with two crossed sutures, one per slip, we use a 4-0 non resorbable monofilament suture. The sutures in place are indicated by the arrows.

CONCLUSIONS

We introduced a new dorsal approach for DIP arthroplasty. The transection of the extensor apparatus is performed in zone 2. Postoperatively, patients receive a DIP splint in slight hyperextension for 2 weeks and start mobilizing the joint without protection 2 weeks postoperatively. With this shorter postoperative splinting time, the postoperative range of motion was similar to that published in the literature for both tendon-sparing and standard approaches.

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